**SPAWAR
Systems Center
San Diego**

TECHNICAL DOCUMENT 3050
January 1999

SSC San Diego Command History Calendar Year 1998

SSC San Diego
San Diego, CA 92152–5001

19990923 020

Preface

The Space and Naval Warfare Systems Center San Diego (SSC San Diego) Command History for calendar year (CY) 1998 is submitted in conformance with OPNAVINST 5750.12E. The history provides a permanent record of CY 1998 activities at SSC San Diego. Although the history covers one calendar year, much of the information was only available on a fiscal year (FY) basis and is so noted in the text.

The history is divided into two main sections. The first section introduces SSC San Diego and describes developments in organization, personnel, and funding. The second section documents technical programs underway during 1998.

Because the results of scientific work often develop out of many years' effort, programs are not always documented annually. Previous command histories provide extensive background articles on many major programs. When possible, background articles are prepared for new or previously untreated programs. By consulting command histories written over a period of several years, a reader can follow the broad thrusts of Center research and development. Much of the information in this history was documented in the SSC San Diego *Outlook* (JoAnne Newton, Editor) and has been revised for use in this history.

Appendices to this document provide supplementary Center information. Appendix A lists achievement awards given in CY 1998. Appendix B lists patents awarded in CY 1998. Appendices C and D provide lists of distinguished visitors hosted by SSC San Diego and major conferences and meetings at SSC San Diego, respectively. Appendix E provides a list of acronyms.

Preceding Page Blank

Contents

Appendices

Figures

Introduction and Administrative Developments

Introduction to SSC San Diego

The Space and Naval Warfare Systems Center San Diego (SSC San Diego) is a full-spectrum research, development, test and evaluation (RDT&E), engineering and fleet support center serving the Navy, Marine Corps, and other Department of Defense (DoD) and national sponsors within its mission, leadership assignments, and prescribed functions. SSC San Diego reports directly to the Commander, Space and Naval Warfare Systems Command (SPAWAR).

Mission

To be the Navy's full-spectrum research, development, test and evaluation, engineering and fleet support center for command, control and communication systems and ocean surveillance and the integration of those systems which overarch multiplatforms.

Leadership and Technology Areas

Consistent with our mission, eight leadership areas are formally assigned to SSC San Diego. These leadership areas clearly represent SSC San Diego's command, control, communication, computers, intelligence, surveillance, and reconnaissance (C^{4}ISR) charter as well as leadership areas outside that scope—ocean engineering and marine mammals. Beyond these, SSC San Diego has demonstrated national- and international-level expertise in a broad range of technology areas.

Assigned Leadership Areas

- Command, control, and communication (C^3) systems
- Command, control, and communication systems countermeasures
- Ocean surveillance systems
- Command, control, and communication modeling and analysis
- Ocean engineering
- Navigation systems and techniques
- Marine mammals
- Integration of space communication and surveillance systems

Technology Areas

- Ocean and littoral surveillance
- Microelectronics
- Communications and networking

- Topside design/antennas
- Command systems
- Computer technology
- Navigation and aircraft C^3
- Intelligence/surveillance/reconnaissance sensors
- Atmospheric effects assessment
- Marine mammals
- Environmental quality technology/assessment

SSC San Diego's Vision

To be the nation's pre-eminent provider of integrated C^4ISR solutions for warrior information dominance.

Unique Technology, Facilities, and Capabilities

As a government laboratory, we provide world-class science and technology with strong ties to industrial, academic, and scientific research and development (R&D) communities. Our R&D is focused by knowledge of user needs and proven by a record of successful transitions of technology to industry and the user community. Our comprehensive facilities and laboratories are primarily located in San Diego, close to major customer organizations, and integrated and networked with worldwide government, industrial, and academic laboratories, and with Navy and joint-service operational users. Our software systems engineering processes are controlled and locally guided by the SSC San Diego Software Engineering Process Office (SEPO), which is nationally recognized for its expertise and training capabilities. Efficient contracting and financial support processes assist our technical teams in meeting challenges.

Domain Knowledge and Expertise

We provide and support large integrated information systems architectures for systems evolving from legacy components to seamlessly integrate the latest state-of-the-art hardware and software capabilities. Our solutions are optimized for total systems requirements, not just for specific components. We provide total interaction management that includes rapid insertion of new technologies and commercial off-the-shelf (COTS) products from concept through installation, testing, training, and systems support. We develop and maintain state-of-the-art technologists through hiring, training, and hands-on technical program involvement. As government employees, we provide long-term continuity for the programs. Our technical breadth allows us to quickly form teams of experts from within SSC San Diego and the government, industrial, and customer communities.

Unique Location and Relationship with Sponsor and Customer

We enjoy the benefits of being a government organization that is collocated in San Diego with our major sponsor while also being geographically positioned near all major components of our Navy and Marine Corps customer community. In addition to having our main workforce near customers in San Diego, SSC San Diego also has personnel permanently duty-stationed with the U.S. Atlantic Command (USACOM) and U.S. Pacific Command (USPACOM) to provide systems-engineering functions. We are also located outside the continental U.S. (CONUS), with particular emphasis in the Pacific Rim where we have permanent detachments in Hawaii; Guam; and Yokosuka, Japan. We provide on-site representation and support for the C^{4}ISR community. Additionally, we serve as the smart buyer from the total-systems perspective, i.e., we emphasize product delivery versus achieving profits. We act as the trusted agents for our customers, sponsors, and industrial partners, providing R&D through In-Service Engineering Agent (ISEA) functions. Our tasking is flexible and can be quickly modified as the situation evolves. This flexibility is extremely important in the C^{4}ISR mission area where technology is changing every 18 months.

Our Assigned Mission—C^{4}ISR

C^{4}ISR provides information dominance to meet a wide variety of Navy, Marine, and joint requirements. It is the link that integrates disparate units and functions into coordinated operational capabilities. With the Navy's C^{4}ISR mission assignment, SSC San Diego is uniquely positioned in this important area. By providing C^{4}ISR solutions to the Navy and Marine Corps, SSC San Diego has demonstrated domain knowledge expertise and experience in land-based, marine surface and subsurface, and air warfare. This gives SSC San Diego a unique competitive advantage over other laboratories in joint-service developments, which is reflected by our participation in many joint-service programs.

Other Important Leadership Areas and Competencies

In addition to our primary C^{4}ISR mission, our leadership areas and competencies include ocean engineering, marine environmental responsibilities, and the Navy's Marine Mammal Program. The impact of limited warfare and military operations on marine mammals and the marine environment is increasingly important. These programs, although separate from our main focus in C^{4}ISR, have been located at SSC San Diego for many years, primarily because of our location and the unique expertise that we have developed in these areas.

Funding

SSC San Diego receives funding from sponsors that include the Space and Naval Warfare Systems Command (SPAWAR), the Defense Advanced Research

Projects Agency (DARPA), the Naval Sea Systems Command (NAVSEA), the Naval Air Systems Command (NAVAIR), the Office of Naval Research (ONR), the U.S. Marine Corps (USMC), and the U.S. Air Force (USAF). Figures 1 through 3 provide funding numbers for Fiscal Year (FY) 1998.

Funding by Sponsor

Funding in FY 1998 totaled $1.165 billion. Funding by sponsor (dollars in millions) included: SPAWAR and Program Executive Office (PEO), $414; NAVSEA and PEOs, $83; NAVAIR and PEOs, $75; DARPA, $202; ONR, $79; other Navy, $148; USMC, $24; USAF, $52; and all other, $88. Figure 1 shows dollars and percentages of total funding by sponsor.

Funding by Appropriation

Funding by appropriation (dollars in millions) included: Research, Development, Testing, and Evaluation (RDT&E), $508; Operations and Maintenance, Navy (O&MN), $176; Other Procurement, Navy (OPN), $237; Federal/Non-DoD, $9; and other, $235. Figure 2 shows dollars and percentages of total funding by appropriation.

Distribution of Funds

Funding by distribution (dollars in millions) included: General Overhead, $46; Indirect Overhead, $49; Direct Contracts, $307; Direct Cites, $510; Direct Material, Travel, and Other, $107; and Direct Labor, $146. Figure 3 shows dollars and percentages by category.
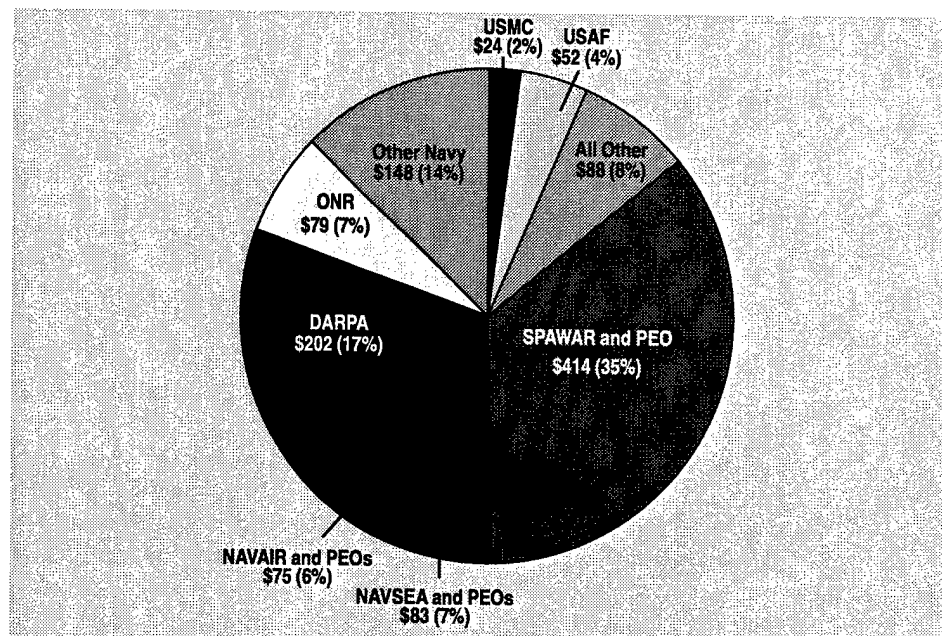
Figure 1. FY 1998 funding by sponsor (dollars in millions).
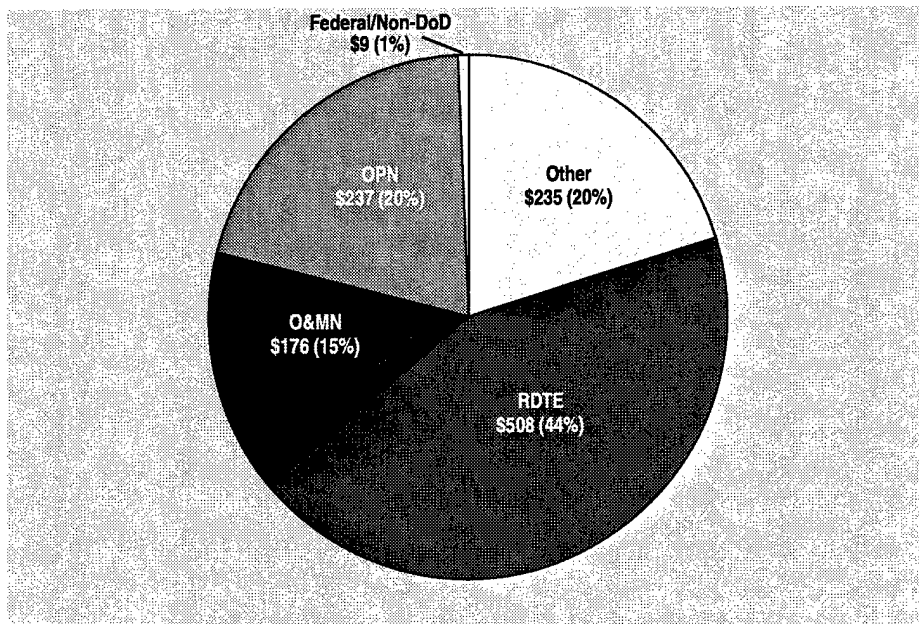
Figure 2. FY 1998 funding by appropriation (dollars in millions).
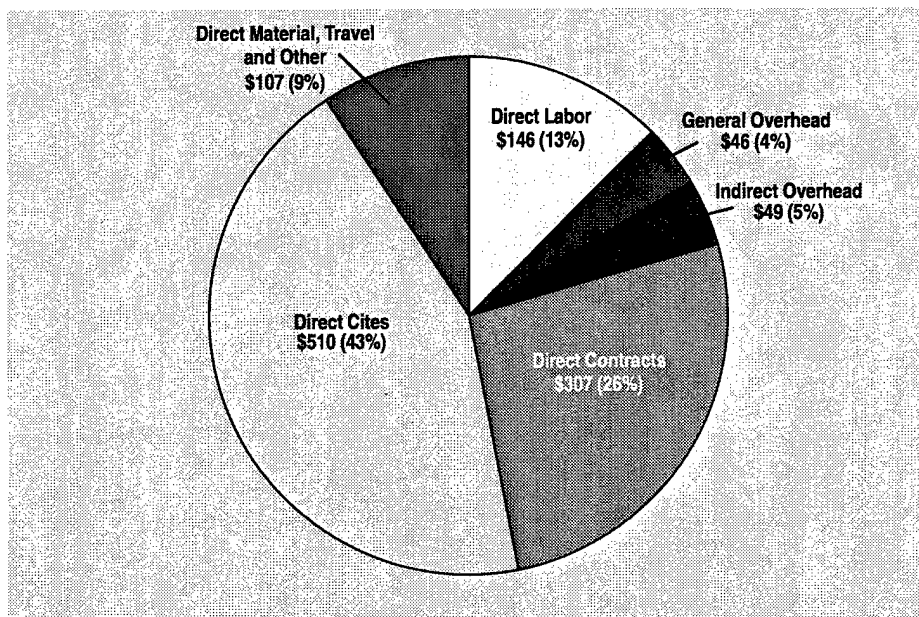
Figure 3. FY 1998 distribution of funds (dollars in millions).

Organization

SSC San Diego has seven major staff and technical departments: Science, Technology, and Engineering; Navigation and Applied Sciences; Command and Control; Fleet Engineering; Intelligence, Surveillance, and Reconnaissance; Communication and Information Systems; and SPAWAR Systems Activity, Pacific. Figure 4 shows SSC San Diego's organization as of October 1998.
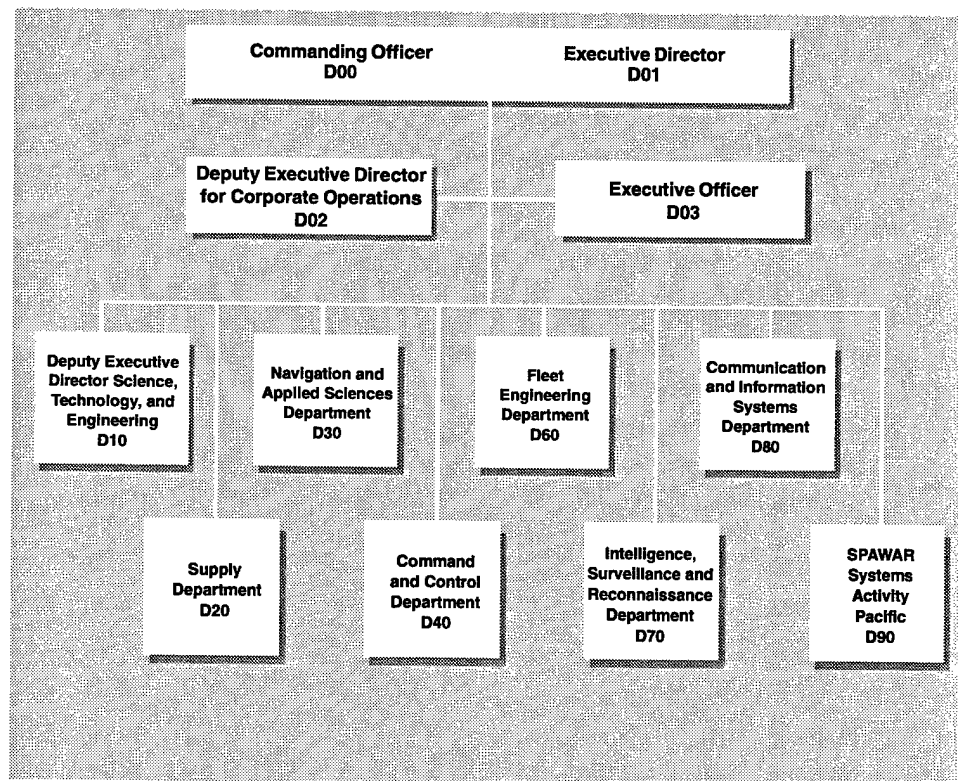
Figure 4. Organization (October 1998).

Personnel

Total personnel in FY 1998 (1 October 1998) was 3439. Figure 5 shows SSC San Diego personnel grouped by major categories.
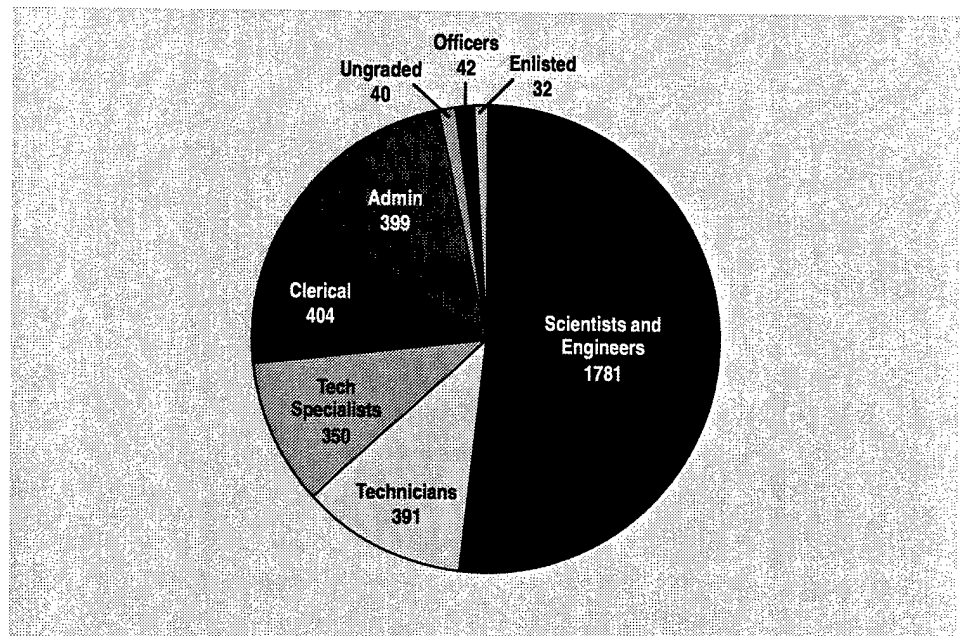
Figure 5. Personnel (October 1998).

Technical Accomplishments

Deputy Executive Directory, Science Technology and Engineering (D10)

Crisis/Consequence Management

The nation is developing ways to strengthen critical infrastructure against weapons of mass destruction, including biological and chemical threats caused by terrorist activity. The Department of Defense mission now addresses this national issue, and requirements are being formulated.

The integration of different information systems can provide collaborative planning tools to support this new mission. SSC San Diego's proven expertise in different information systems that provide data, maps, listings of national resources, sensor technologies, computer security, wireless communications, and the Center's knowledge of local and national military and civilian communities are important resources in this area.

The Federal Emergency Management Agency (FEMA) is key to any effort related to crisis/consequence management. In July 1998, SSC San Diego cosponsored the FEMA/Technical Support Working Group (TSWG) Technology Partnerships Workshop and Exhibit held at Argonne National Laboratory. The Center demonstrated the DAWN (Defense Information System Agency/Defense Information System Network Asynchronous Transfer Mode Wide Area Network) approach to integrating commercial off-the-shelf (COTS) products to form a wireless video, voice, data, and white board representing an integrated IT-21 (Information Technology for the 21st Century) solution example targeted to the audience.

Following the conference, FEMA and SSC San Diego signed a Memorandum of Understanding (MOU) that will allow the Center to transfer technologies and provide supporting technological solutions to the emergency management community. The MOU extends the scope of working with emergency managers beyond the local community and provides greater opportunities to integrate information systems to tactical, regional, command, national, or strategic levels.

Crisis/Consequence Management Laboratory

The Defense Advanced Research Projects Agency (DARPA) Information Technology Office (ITO) tasked SSC San Diego to establish DARPA's Crisis/Consequence Management Laboratory. The ITO needs an evaluation environment to test the value of enhanced situational awareness in realistic scenarios, such as an attack with weapons of mass destruction. On 12 October 1998, the Center's emulation complex was designated as DARPA's Crisis/Consequence Management Laboratory. The Crisis/Consequence Management Laboratory looks at newly emerging technologies being developed under ITO's information

management program. A remote access from the Commander, Navy Region Southwest, Regional Planning Agent, can evaluate new technologies. These technologies will support planning, coordinating, and executing emergency management and emergency response functions for commands within the Navy Region Southwest area of responsibility.

In-House Laboratory Independent Research

New and innovative ideas proposed by SSC San Diego scientists and engineers are supported with discretionary funding provided by In-House Laboratory Independent Research (ILIR) programs. These programs support initial research in many areas of interest to the Navy. The following projects were transitioned in FY 1998.

Applications of Stochastic Nonlinear Dynamics to Communications

This ILIR project investigated the control and optimization of electronic communication systems and devices via nonlinear dynamics. Specifically, the nonlinear model of the analog phase-locked loop (PLL) does benefit from the optimization of the system noise at low signal-to-noise ratios (SNRs). This intriguing cooperative effect arises out of the coupling between deterministic and random dynamics in a nonlinear system and is known as Stochastic Resonance (SR). Nonlinear dynamics should improve PLL-based communication systems in two distinct application areas. The first application is at the component level by tuning the amount of noise present in an individual PLL. Here, the cycle slip problem (the sudden noise-induced jump from one stable state to the next) is recast as a time-dependent shot noise process that exhibits SR. The second application for improving PLL-based communication systems is when nonlinear elements form arrays. By employing the nonidentical oscillator theory, "tuning" the spatial disorder, the SNR of an array of PLLs improves, as well as the frequency and phase locking across the array. Analytical and numerical studies of noise in nonlinear arrays were complemented by a series of experiments on coupled microelectronic elements.

Because of the progress achieved during FY 1998, this ILIR project was completed and transitioned to direct ONR 6.1 funding. The new program is titled "Applications of Stochastic Resonance in Communications."

Fiber-Optic Add/Drop Multiplexers

This ILIR project is a continuing effort studying a novel way to produce add/drop multiplexers for fiber-optic systems operating with multiple, closely spaced wavelengths of signal light. The approach is to create Bragg gratings within fused-fiber biconical tapered couplers. This is done by producing spatial variations in the refractive index while using interference-patterned ultra-violet illumination. This project explores the effects of material, fabrication, and device design.

Because of the progress achieved during FY 1998, the FY 1999 research effort has received more than 50-percent support from ONR 6.2 funding under a pro-

gram to improve wavelength division multiplexers used in undersea surveillance systems.

Surface-Plasmon Flat-Panel Display

This ILIR project, completed in FY 1998, investigated the possibility of developing a novel flat-panel display technology by using the surface-plasmon effect for color generation and light modulation. Accomplishments included demonstration of color-selective absorption by surface plasmons and the projection of primary colors (cyan, yellow, and magenta) from a surface-plasmon tunable filter; demonstration of a broadband light modulator that uses the surface-plasmon effect to achieve gray scales; and the design and fabrication of a prototype surface-plasmon display.

The transition of surface-plasmon-based light modulation technology to the commercial sector is proceeding via an existing Navy-issued Cooperative Research and Development Agreement between SSC San Diego and Optron Systems, Inc., of Bedford, MA.

Telesonar Channel Models

This ILIR project was initiated in FY 1998 and is continuing in FY 1999. This project seeks to understand undersea acoustic communication channels through theoretical and numerical modeling of the propagation physics.

"Telesonar" is undersea acoustic signaling for wireless networks of distributed sensors in shallow and very shallow water. Telesonar technology relies on signal-processing techniques to overcome the deleterious aspects of the physical channel and to exploit advantageous channel features. The technology employs various spread-spectrum modulation techniques with signal energy, typically in the 8- to 16-kHz acoustic band. Propagation of acoustic signals in shallow water is impaired by a complex multipath structure and the nonhomogeneous, nonstationary nature of the medium and its boundaries. This project is developing a physics-based numerical propagation model that attempts to account for these effects.

Results from this project are being transitioned into a new Small Business Innovation Research (SBIR) program initiated in FY 1999. SBIR Topic N99–011, "Directional Underwater Acoustic Communications Transducer," is supported by ONR SBIR funds. The program is incorporating results from the Telesonar Channel Model research via technology transfer to the winning contractor.

Software Process Initiative (SPI)

SSC San Diego's Software Process Initiative (SPI), adopted in 1998, is intended to improve the quality and productivity of software products produced at SSC San Diego. SPI goals include:

- Produce quality software in shorter development cycles
- Reduce the costs of supporting software throughout the life-cycle

- Rapidly introduce new technology into the product and the software development process

- Integrate software across traditional system boundaries to provide a composite set of capabilities to the end user

- Achieve the software engineering and project management capability defined through Capability Maturity Model Level 3

The Software Engineering Process Office (SEPO) (D12) will facilitate and provide aids to software projects to achieve the above goals. SEPO will accomplish this by serving as the SSC San Diego advocate for software process development, performance, and improvement. SEPO will promote an environment that encourages and enables software engineering and project management best practices and champions a Center-wide process culture.

The Center will implement SPI on selected pilot projects within each department and then migrate the processes, best practices, and lessons learned to other software projects across the Center. Pilot projects meeting set criteria have been selected. One such project is the Embeddable INFOSEC Product (EIP) project, which recently achieved a Trusted Software Capability Maturity Model Level 2 rating.

Navigation and Applied Sciences (D30)

Navigation Sensor System Interface (NAVSSI)

The Navigation Sensor System Interface (NAVSSI) is a shipboard navigation processor designed to integrate shipboard navigation sensors and systems and distribute a central source of highly accurate real-time navigation and time data to combat, combat support, and communication systems. NAVSSI also provides an electronic navigator's workstation to support safe navigation using digital nautical charts that will replace paper charts. NAVSSI is currently deployed on over 60 surface combatants, and there are plans to install it aboard another hundred.

The Center completed laboratory integration of the Precise Lightweight GPS Receiver (PLGR) with the NAVSSI. This new capability can be easily added to existing NAVSSI installations to provide a backup Global Positioning System (GPS) capability now that the AN/SRN–25 GPS receiver is being retired from service in the Pacific Fleet.

Environmental Quality

SSC San Diego provides cost-effective technology for Navy environmental compliance and restoration through ecological risk assessment and restoration research, sediment characterization and management technology development, and environmental sensor and instrument development.

Bight 1998 Field Sampling

SSC San Diego's Marine Environmental Quality Branch has been performing field collections (fish trawls and benthic sampling) in San Diego Bay and Los Angeles/Long Beach Harbor aboard RV ECOS (a 40-foot survey vessel) to support a major Southern California Bight Regional Monitoring effort for which the Navy is one of 45 participants. The work is a unique cooperative effort among environmental regulatory, discharger, scientific, and technical participants. SSC San Diego's work is supported through funding from the Commander, Navy Region Southwest; the Chief of Naval Operations (CNO) (N457); and the Commander-in-Chief, Pacific Fleet (CINCPACFLT). Center scientists perform two assessments: QWIKLITE toxicity assays and COMET ASSAY (DNA damage assessment) for bottom organism health assessments.

Experimental Storm Water Treatment System

The Navy is again taking a lead in environmental remediation by addressing polluting contaminants in road runoff from storm drains. SSC San Diego installed a new, experimental storm water treatment system on Naval Station San Diego land. A private research and development company developed the system.

Marine Mammal Program

SSC San Diego manages the Navy's Marine Mammal Program, maintaining a cutting-edge research program and managing four operational systems employing

marine mammals: Pingered Object Recovery, Swimmer Defense, and two Mine Countermeasures systems.

Seaver Grant for Dolphin Research

Members of the Center's Research and Animal Care Branch, along with members of the Harvard Medical School and Woods Hole Oceanographic Institute, received a Seaver Grant for Dolphin Research. The Branch performs basic research on psychoacoustics. The grant will further fund research currently sponsored by the Office of Naval Research.

The Branch is developing a computational model of dolphin echolocation. One of the more important questions for the model is how the dolphin perceives echoes using its hearing to detect and make fine discriminations between and among targets.

Dolphin Launch and Recovery System

The Marine Mammal Systems, developed by SSC San Diego and operated by the Explosive Ordnance Disposal Mobile Unit Three (EODMUTHREE), can now operate from ships deployed at sea. These dolphin systems can be temporarily housed aboard amphibious ships, launched, and recovered from the stern gate, and transported to operational areas. An essential part of these operations is the launch and recovery of the boats in varying sea states while the dolphins, handlers, and equipment are onboard.

Special trailers were developed for both hard-hulled craft and rigid-hulled inflatable boats (RHIBs). A RHIB recovery system was developed and tested during RIMPAC (Rim of the Pacific) 1998 fleet exercises conducted off the Hawaiian Islands.

Mk 7 Marine Mammal System (MMS)

The Mk 7 Marine Mammal System (MMS) Detachment assigned to Explosive Ordnance Disposal Mobile Unit Three was deployed for the Maritime Combined Operations Training (MARCOT)/Unified Spirit Exercise. The exercise included 29 ships from foreign nations, 10 ships from the U.S., and 5000 marines. The Mk 7 MMS was part of the Mine Countermeasures force to clear the way for a mock invasion by allied forces. The Center's Biosciences Division supported this exercise with veterinarians, technical representatives, equipment support personnel, and equipment.

Waterside Security System (WSS)

The Waterside Security System (WSS) is an integrated, multiple-sensor security system that automatically detects and tracks waterborne targets, identifies and alerts on all threats, and aids in threat assessment and response. SSC San Diego identifies, tests, and evaluates commercially available physical security equipment having application to force protection at waterside facilities worldwide and provides engineering support to systems transitioned to the Fleet. Preplanned

product improvements include a rapidly deployable configuration; uncooled thermal imagers; PC-based command, control, and communications; a display element; and floating barriers.

The Navy Award of Merit for Group Achievement was presented to the WSS team. The WSS protects critical waterfront facilities and ships in port against waterborne intruders. The WSS provides a proven means for automatically detecting, localizing, and assessing waterborne threats ranging from politically motivated individuals to terrorists and special operational units. Targets include speedboats, sneak craft, surface swimmers, scuba divers, and swimmer delivery vehicles. The WSS team made specific achievements in three areas:

1. The team built and installed the Electronic Harbor Security System, which is a variant of WSS specifically tailored for the environment at the Naval Submarine Base, Kings Bay, Georgia.

2. The team coordinated and effected rapid installation of a WQX-2 swimmer detection sonar in the Persian Gulf in response to a short-fuse requirement from Commander, Fifth Fleet.

3. The concept of a transportable WSS, in conjunction with the quarterly meeting of the DoD Physical Security Equipment Action Group, was developed and demonstrated by the team.

Waterside Security System Demonstration

A portable WSS was demonstrated to the U.S. Marine Corps Fleet Antiterrorist Security Team at Naval Submarine Base, Bangor, Washington.

The demonstrated configuration included a radar with a personal computer-based track processor, a color closed-circuit television camera, and an uncooled thermal-imaging sensor mounted on an azimuth-elevation platform. These detection and assessment sensors are interfaced with a command, control, communications, and display (C^3D) console.

This demonstration was made possible, in large part, through a significant redesign of the C^3D element and the radar track processor.

Mobile Detection Assessment Response System (MDARS)

MDARS is a joint-service effort to provide automated intrusion detection and inventory assessment capability for DoD warehouses and storage sites using multiple coordinated internal and external robots. SSC San Diego provides technical support for the MDARS program, acting as the Technical Director, System Integrator, and Software Developer. SSC San Diego has developed the Multiple Resource Host Architecture (MRHA) to allow the control of multiple robots, sensors, and other devices simultaneously. MRHA software was developed in Ada and employs the Windows NT operating system.

MDARS Patent

Patent No. 5,659,779, *System for Assigning Computer Resources to Control Multiple Computer Directed Devices,* by Bart Everett, Advanced Systems

Division Associate for Engineering (D3701); and Gary Gilbreath, Robin Laird, and Tracy Heath-Pastore, Adaptive Systems Branch (D371).

This MDARS patent covers the MRHA. The MRHA is a sophisticated command and control architecture that can provide supervised autonomous control of a number of indoor and outdoor security robots

Fifteen patents have been awarded to members of the MDARS team for innovations in the field of robotics over the past several years.

MDARS-I Security Robots

Two Mobile Detection Assessment Response System-Interior (MDARS-I) security robots were put into operation in an actual field installation at the Anniston Army Depot in Anniston, Alabama. The installation and user training were conducted under the technical direction of SSC San Diego's Associate for Robotics, Advanced Systems and the Adaptive Systems Branch.

The robots take turns patrolling the Anniston warehouse at night and on weekends, providing automated inventory and security assessment during nonduty hours. They function with no human interaction unless an exceptional event is encountered. They conduct continuous surveillance for intruders and environmental threats such as smoke, fire, water main leaks, and chemical spills.

Global Positioning System (GPS) Central Engineering Activity (CEA)

The Global Positioning System (GPS) Central Engineering Activity (CEA) was relocated to SSC San Diego in June 1997. The GPS User Equipment CEA has been the Navy's lead laboratory for developing GPS receivers. The CEA was established in 1980 in Warminster, PA. Base Closure and Realignment Commission action in 1995 (BRAC '95) directed relocation of the Warminster Detachment to San Diego. The new laboratory is a unique state-of-the-art facility, providing GPS User Equipment with a development, integration, test, and evaluation environment. Through real-time simulation of both GPS satellite signals and host-vehicle communications, the facility exercises GPS User Equipment hardware and software dynamically under precise laboratory conditions. Environments can be exactly replicated as many times as needed.

SSC San Diego's Global Positioning and Navigation Systems Division developed scenario start-time synchronization with the Cesium Frequency standard, and the associated time-code-generator was verified. This will allow long-term-Y or maintenance-Y testing to be performed in the GPS CEA.

Remediation Research Laboratory

The Remediation Research Laboratory investigates polluted sediments in harbors associated with the Navy. Marine sediments are evaluated to determine where polluted areas are and how to remediate the problems in those areas. Most recently, COTS technology was applied to several marine site assessments.

In 1998, a member of SSC San Diego's Environmental/Biotechnology Branch received the Exemplary Achievement Award for leadership in demonstrating field-portable X-ray fluorescence spectrometry for measuring metals in marine sediments and investigating particle separation.

The field-portable X-ray fluorescent spectrometer (FPXRF) is a small, analytical instrument that can provide rapid, multi-element analysis in different matrices, including sediment. The instrument has been used at different Navy sites around the country. One of the main purposes of using a field screening tool such as FPXRF is to pinpoint hot spots and to guide on-site decision-making for mapping strategies and detailed sampling.

Command and Control (D40)

Copernicus

The proliferation of sensor streams, different formats, protocols, organizational sponsors, complex programmatic agendas, and conflicting operational goals has made the mechanics of the military's C⁴I systems far too complex. In 1990, the Navy introduced an approach to solve this problem: the Copernicus Architecture. An interactive framework of pillars, Copernicus links the C⁴I processes of the warfighter at all echelons of command. The Copernicus Architecture continues to evolve to support Joint Vision 2010; SSC San Diego continues to play major roles in its evolution.

Copernicus Awards were presented to members of SSC San Diego's Code D4204, Director of Command, Control, Communications, Computers, and Intelligence (C⁴I) Systems (Hawaii). The Chief of Naval Operations (N6) established the Copernicus Awards to recognize individual contributions to C⁴I, information systems, or information warfare.

As the principal architect and system engineer for design and implementation of the Commander, Seventh Fleet (COMSEVENTHFLT) Global Network Initiative, D4204 was instrumental in the initial implementation of the Information Technology for the 21st Century (IT-21) C⁴I initiative

This effort extended the local area network on the COMSEVENTHFLT flagship, USS *Blue Ridge* (LCC 19), to a seamless wide area network that maximizes available bandwidth and produces a virtual global network. It links the fleet commander to subordinates at sea and superiors ashore. The entire Navy adopted this project as IT-21, a sweeping initiative to replace stovepipe C⁴I systems with integrated capabilities over a virtual worldwide network.

Global Command and Control System

The Global Command Control System (GCCS) will provide joint and service component commanders with a set of automated tools and communications for operations planning, execution monitoring, and logistics sustainment of joint warfighting efforts. GCCS will be derived from the core system formed by the Global Command and Control System–Maritime. SSC San Diego is the systems engineering advisor and integrator of the core GCCS components.

On 29 May 1998, the Commander, Operational Test and Evaluation Force (COMOPTEVFOR) released the results of the operational evaluation (OPE-VAL) of the Joint Maritime Command Information System (JMCIS) Increment III, commonly called JMCIS '98. Note: JMCIS has been renamed the Global Command and Control System–Maritime (GCCS–M). COMOPTEVFOR found that JMCIS was operationally effective and suitable. Approval for full fleet release was recommended for the entire system, which includes the afloat, ashore, and tactical support center/tactical mobile variants.

JMCIS '98 is the first service product based upon the Defense Information Infrastructure Common Operating Environment to successfully complete this major milestone. The operational test was conducted at 10 sites simultaneously and was the largest and most complicated command, control, communication, computers, and intelligence (C⁴I) test ever conducted by COMOPTEVFOR.

Image Product Library (IPL)

The Image Product Library (IPL) program is a DoD initiative sponsored by National Imagery and Mapping Agency (NIMA) to develop the standard U.S. Imagery System product archives system. This is a part of NIMA's Pilot Accelerated Architecture Acquisition Initiative for enhanced digital imagery request, distribution, and management for all echelons within the national and Department of Defense imagery intelligence community.

The Navy Award of Merit for Group Achievement was presented on 9 October 1998 to the IPL program team from SSC San Diego's Philadelphia Detachment.

Program team members fielded and supported the IPL Version 1.0 system. Version 1.0 provides the imagery community with an integrated architecture for disseminating and archiving imagery products. The team defined IPL system architectures and purchased IPL hardware suites. They delivered systems to sites, installed hardware and software, configured IPL databases and networks, and provided training at numerous DoD sites within the European, Atlantic, and Pacific commands. The program team provided comprehensive customer support through a 7-day, 24-hour center that assisted commands in defining their imagery architecture needs and offered quick response to complex technical problems.

Digital Camera Receiving Station (DCRS)

The Digital Camera Receiving Station (DCRS) provides the capability for the near-real-time reception of Tactical Aircraft Reconnaissance Pod System-Digital Imagery [TARPS(DI)] manned tactical reconnaissance imagery and dissemination of images to various C⁴I systems via either local area network or very-high-frequency/ultra-high-frequency radios.

SSC San Diego Detachment Philadelphia's Imagery Support Office (ISO) achieved initial operational capability of the F-14 TARPS(DI) in less than 2 years since the project's inception.

For the first time, manned tactical reconnaissance has a real edge. The force-level commander is provided with the ability to receive imagery, analyze it, and redirect strike assets while the reconnaissance aircraft are still in the area, all within minutes.

The relative simplicity and low cost of the DCRS means it can be packaged and deployed with amphibious and maritime interdiction forces, and ground units. This permits TARPS(DI) aircraft to work directly with the unit requesting the reconnaissance services.

C⁴ISR Systems Integration Environment (C⁴ISR SIE)

The C⁴ISR Systems Integration Environment (C⁴ISR SIE) is the Navy's premier C⁴ISR integration and test facility. The C⁴ISR SIE exploits current technology to realize cost-effective and timely integrated systems development and implementation. A distributed environment consisting of existing laboratory facilities, systems, and core personnel, the C⁴ISR SIE supports life-cycle acquisition, supports system integration and test, and assures cost-effective implementation of integrated, joint, and interoperable naval C⁴ISR systems. The C⁴ISR SIE pursues four main objectives:

- Support C⁴ISR from initial concept to end of life.

- Provide a collaborative engineering environment supporting technology insertion, concept development, architecture development, system-of-systems integration and test, systems interoperability, program manager's systems integration and test and experimentation/demonstration.

- Provide a reconfigurable and scalable C⁴ISR test capability by interconnecting existing SPAWAR facilities and labs and by interfacing with external facilities and labs.

- Serve as SPAWAR's technical interface to the Navy's Maritime Battle Center.

Supporting these objectives is an extensive database of C⁴ISR capabilities and dedicated personnel to coordinate tests. The Scheduling and Engineering Tool (SET) is a current database of laboratories, systems, schedules, equipment, programs, and connectivity. The database is used to mitigate scheduling conflicts, to coordinate events, and to provide the collaboration needed to produce fully integrated systems before they are deployed. SET currently provides data for over 283 labs and facilities. While the database is available to the general C⁴ISR community, the C⁴ISR SIE's experienced lead systems engineers offer expert assistance in organizing and executing tests, enabling the best possible use of C⁴ISR test capabilities.

The importance of the C⁴ISR SIE to the maritime C⁴ISR community lies in its integration capabilities—by facilitating integration across product lines, the C⁴ISR SIE contributes to the maritime system-of-systems capability, in turn enhancing battlespace capabilities for the warfighter.

On 12 February 1998, the C⁴ISR SIE received SPAWAR's Lightning Bolt Award for team excellence. The Lightning Bolt Award was a group achievement award presented for contributions of the C⁴ISR SIE team. Their efforts resulted in successfully bringing system-engineered solutions, validated in the virtual lab environment, to the Fleet prior to deployment. Members of the SPAWAR C⁴ISR SIE team displayed dedication to the Information Technology for the Twenty-First Century (IT-21) initiative.

Information Operations Center of Excellence (IOCOE)

SSC San Diego's Information Operations Center of Excellence (IOCOE) was established to develop integrated strategies, concepts, and services; identify,

assess, and demonstrate current and future technologies in an integrated, operationally valid environment; and provide a "neutral" technologically sophisticated environment for helping operators with information operations policies and doctrine.

With the goal of bringing information warriors together with concepts and technologies to excel in information operations, the IOCOE enhances the Center's participation in both Navy and joint information operations activities. Looking ahead to the 21st Century, the IOCOE is expected to serve as a highly recognized forum and facility for information operations technology, doctrine, and requirements definition throughout the information operations community.

A key component of the IOCOE is the Information Operations Center of the Future (IOCOF), a flexible, modular facility that incorporates emerging technologies, development programs, and real-world challenges into a common environment. The IOCOF began as an idea to develop an area within SSC San Diego that could help tie together a variety of work in the rapidly developing field of information operations. The IOCOF achieved initial operational capability on 19 January 1999. While providing a common ground for integrating systems developed by the various technical codes at SSC San Diego, it will also facilitate looking into the future to help guide and shape the ability of the nation to meet the very real threats and challenges of the information age.

The new IOCOF was the venue for the wargame Vigilant Protector 99–1 (VP 99–1). Government and contractor personnel of the IOCOF team developed and facilitated this seminar game for members of Commander, Third Fleet and the First Marine Expeditionary Force (I MEF) staffs on 20–23 October 1998. Invited observers from several commands with key roles in Information Operations added significantly to this event's success.

The goal of VP 99–1 was to foster understanding of the effects of the Information Operations Conditions policy, recently developed by the Joint Staff in Washington, D.C., on the ability of a Joint Task Force to accomplish its mission.

Fleet Engineering (D60)

Intelligent Management Application System (IMAS)

The Intelligent Management Application System (IMAS) is a federated, autonomic, transaction-based business-to-business extranet software application architecture. IMAS can be used to automate most business processes without requiring an enterprise to change existing business rules. IMAS systems support multiple databases, including legacy systems. Users can use data from a database without understanding how to access and manipulate the database. These systems are based on true thin-client access, can be rapidly implemented for new enterprises, are IT-21 compliant, and require minimal user training.

The IMAS architecture was developed by the SSC San Diego's Advanced Test Engineering Technology Branch and deployed to the Fleet. The IMAS streamlines the process through which support is provided and allows direct access to Navy-wide data resources over the Internet.

Electronic Support Measures (ESM)

The Submarine ESM Systems Branch provides In-Service Engineering Activity (ISEA) support that emphasizes reducing total life-cycle fleet ownership costs while improving operational capabilities through the innovative application of COTS technology. Special capabilities include:

- Radar deinterleaver and signal-processor development

- Application of high-speed digitization techniques

- Full-spectrum logistics support

- Proven COTS insertion capability at the subsystem level

- Innovative methods for combining obsolescence and failure analysis data that create COTS insertion opportunities

The Submarine ESM Systems Engineering Branch was designated as the ISEA for the AN/BRD–7 computer system. The branch was tasked by Naval Sea Systems Command, Submarine Program Management Office (PMO–401), to provide life-cycle support.

The AN/BRD–7 provides automatic detection and direction-finding capability to submarines in the *Sturgeon* class (SSN 637), *Los Angeles* class (SSN 688), and *Seawolf* class (SSN 21). Introduced in the early 1970s, the AN/BRD–7 user-machine interface began to encounter rapidly rising obsolescence by the early 1990s.

SSC San Diego's challenge was to develop a new system that would allow for easy growth capability while interfacing with other systems at a reduced cost to the Fleet. The new system, the ECP 150, addresses two significant obsolescence issues and consolidates these issues into a single system upgrade.

With ECP 150's implementation, the mean time between failures of the unit is significantly improved over the obsolete unit. COTS hardware and software reduce the Fleet's cost of ownership and improve maintenance.

Integrated Voice Communications Systems

The Integrated Voice Communications Systems Branch offers a full range of engineering and technical services in support of fleet interior voice communications systems. The branch is the primary support agent for West Coast Integrated Voice Communications System, Man on the Move communications, General Announcing Systems, HYDRA, and Voice logging systems. As primary West Coast support agent, the Branch provides the Fleet with:

- On-call technical assistance
- On-the-air troubleshooting, testing, and link assessment
- System analysis, design, and engineering
- Installation services worldwide

The branch is the service department of the Naval Phone system in the Pacific Ocean region. Branch personnel perform installation planning, service, support, and training on a wide spectrum of telephone equipment.

SSC San Diego's Integrated Voice Communications Systems participated in the electronic equipment design, procurement, and installation of the new regional Federal Consolidated 911 Dispatch Center. Tasking included installation of a 50-kilovolt-ampere uninterrupted power supply system, 17 antennas, and all computer/radio dispatch equipment.

The facility is the first 911 dispatch center in DoD to allow fire, medical, and security dispatching from one location for all Navy bases in the San Diego region.

Meteorological and Oceanographic (METOC) Systems

The Meteorological and Oceanographic (METOC) Systems Branch is the In-Service Engineering Agent (ISEA) for C^{4}ISR METOC programs, including the Tactical Environmental Support System, AN/UMK–3, and Marine Corps Meteorological Mobile Facility (Replacement), AN/TMQ–44A. Special capabilities include:

- METOC Systems Lab
- System engineering and integration
- Full life-cycle support

The METOC Systems Branch designed, produced, and fielded the Tactical Environmental Support System (TESS) Next Century Transition (NC T) in an accelerated 6-month time frame (February–July 1997). TESS NC T replaces

existing proprietary UNIX-based hardware and a monolithic software build with new technology personal computers following IT-21 standards. The program was able to significantly reduce development and life-cycle costs by maximizing use of COTS hardware and software.

TESS NC T underwent formal follow-on test and evaluation in December 1997 and received a thumbs-up report from the Operational Test and Evaluation Force.

RADIAC Calibration Laboratory

The new SSC San Diego RADIAC (Radioactivity Detection, Indication, and Computation) Calibration Laboratory opened on 4 March 1998. The mission of the RADIAC Calibration Laboratory is to test, calibrate, and repair distributed radiation detection equipment for the U.S. Navy.

This mission includes tasks ranging from simple cleaning and adjustment of instruments to a complete rebuild. The RADIAC Laboratory services upwards of 300 units per month. At any one time, the facility may have the radiation detection instruments for two-thirds of the ships in port.

A previous laboratory was located at Naval Station San Diego for over 40 years. The laboratory would have required major refurbishment to continue providing a serviceable structure for use by RADIAC. The existing radiation source had reached the end of its serviceable life and was overdue for replacement with a new radiation source.

The new site, Battery Ashburn, was originally constructed as a defensive gun emplacement during World War II. When it was built, tons of concrete, rock, and earth were used to shield the facility from the possibility of heavy bombardment. That same shielding now provides a perfect environment to conduct calibration laboratory operations. The new state-of-the-art laboratory will provide the Navy with reliable support far into the next century.

Intelligence, Surveillance, and Reconnaissance Department (D70)

Extending the Littoral Battlespace (ELB)

The Extending the Littoral Battlespace (ELB) program seeks to demonstrate technology and procedures to enable seamless operations by joint forces operating in the world's littoral areas. Emerging technologies may provide an enhanced, integrated communications, command and control, sensors, and targeting capability. ELB will enhance expeditionary force operations in an extended littoral battlespace by providing these units the means for rapid employment, maneuver, and fire support from the sea.

An Enhanced Combat Operations Center (ECOC) is under construction onboard the Sea-Based Battle Laboratory, USS *Coronado* (AGF-11), Commander, Third Fleet flagship. It will include the ELB Advanced Concept Technology Demonstration (ACTD).

Areas for demonstration include flattened, rapid, webbed, distributed command and control processes; common situational understanding; fully coupled decision/planning/execution system on a shared battlespace network; intelligent networks; and an order of magnitude improvement in combined fires response time.

The ELB ACTD executing agents are the Office of Naval Research and the Commanding General Marine Corps Combat Development Command. The operational sponsor is the Commander in Chief, U.S. Pacific Command.

The ELB Team will provide SE&I, command and control, fires and targeting, and communications support. During FY 1999, a major system integration test is planned. Also planned are two full system tests, a dress rehearsal, and a major system demonstration (MSD1). Additionally, post-MSD1 operations and maintenance activities and planning for MSD2 (FY 2001) will occur.

Ocean Engineering

As a leadership area assigned to SSC San Diego by the Assistant Secretary of the Navy (Research, Development and Acquisition), ocean engineering at SSC San Diego covers the full spectrum of system acquisition from technology development through fleet support. This includes accelerated development, test, and evaluation of emergent fleet requirement systems and hardware. Programs have included deployment and at-sea test and evaluation of undersea surveillance systems; the development of unmanned undersea systems and related technologies, including propulsion systems, non-metallic materials for viewports and pressure housings, underwater fiber-optic and acoustic communications links, and launch and recovery systems; and the in-service engineering, maintenance, and upgrades of manned and unmanned fleet assets (including Deep Submergence Rescue Vehicle, Deep Submergence Vehicle, Advanced Tethered Vehicle, and USS *Dolphin*).

The Advanced Tethered Vehicle (ATV) assisted the National Geographic Society in locating the wreck of the World War II aircraft carrier USS *Yorktown*. The ATV was first designed and built by SSC San Diego predecessor Naval Ocean Systems Center (NOSC). The expedition to find USS *Yorktown* was sponsored by the National Geographic Society and the Institute for Exploration. It was announced that USS *Yorktown* was found on 19 May, resting at the bottom of the Pacific Ocean, 16,650 feet below the surface.

The University of Hawaii's towed search system, MR-1, was operated from the Navy deep submergence support ship, *Laney Chouest*. MR-1 used sonar to locate huge objects believed to be *Yorktown* and other ships lost during the Battle of Midway on 4 June 1942. The ATV then located, mapped, explored, and photographed the remains of those ships through its capability to take high-resolution photographs to 20,000 feet underwater.

Transducer Evaluation Center (TRANSDEC)

The Transducer Evaluation Center (TRANSDEC) is a controlled-environment, low-ambient-noise, conveniently accessible transducer calibration and underwater acoustic test facility. Operational since June 1964, the facility performs research and development tests, preproduction and production evaluation, and acceptance testing of underwater electro-acoustic transducers for the government, DoD contractors, private industry, and allied nations. TRANSDEC can perform measurements for a complete transducer evaluation.

The low ambient noise level in the TRANSDEC pool is ideal for investigating the radiated noise of mechanical devices such as underwater motors, pumps, and low-thrust propulsion systems. Although not filtered, the water clarity in the pool is excellent for photographic work and optical experiments.

In 1998, TRANSDEC found a new application in medical research technology by testing artificial heart valves. Research to compare the acoustic resonance of a perfect valve with a damaged valve was performed in the anechoic environment of the TRANSDEC. The testing supported research that will identify methods to detect the heart valves likely to fracture.

USS *Dolphin*

USS *Dolphin* is the Navy's only operational diesel-electric, deep-diving research and development submarine. *Dolphin* provides a cost-effective platform for both scientific research and test and evaluation programs. Working with Naval Sea Systems Command (PMS 395) and Submarine Development Squadron 5, SSC San Diego provides homeport to the submarine, which can be modified internally or externally to allow installation of specialized equipment. USS *Dolphin* also functions as a threat diesel-electric or target vehicle for evaluation of emerging surveillance or antisubmarine warfare technologies.

USS *Dolphin* reached a 30th anniversary recently while dry-docked at the 32nd Street Naval Station. For 30 years, USS *Dolphin* has demonstrated and tested state-of-the-art capabilities for the Navy.

In December 1998, USS *Dolphin* successfully completed sea trials. USS *Dolphin* is fully operational and committed to an aggressive series of RDT&E operations for FY 1999. *Dolphin* is scheduled to support numerous programs such as Littoral Airborne Sensor Hyperspectral, Littoral Advanced Warfare Development, Telesonar/Sublink '99, On-Hull Extremely Low Frequency Antenna, and Advanced Shallow Water Torpedo Guidance and Control Testing.

Communication and Information Systems (D80)

Antenna Development

SSC San Diego provides unique capabilities for complex shipboard topside antenna design, including antenna modeling capabilities and a one-of-a-kind arch that allows empirical testing of shipboard antennas. The Center is also developing the Multifunction Electromagnetic Radiating System, which combines four separate information transfer systems in one device. Another system is the Advanced Enclosed Mast/Sensor System, a composite structure that eliminates the need for a variety of antennas with their own radomes on surface ships yet provides a lower radar-cross-section profile.

The Very Low Frequency/Low Frequency (VLF/LF) antenna engineering group successfully completed the design, testing, and installation of new high-voltage insulators at the transmitting station at Naval Radio Transmitter Facility (NRTF) VLF Cutler, ME. VLF Cutler is the lynchpin transmitting station in a network of VLF/LF stations located around the world.

SATCOM Systems and Technologies

Satellite communication (SATCOM) is central to dynamic interoperable connectivity, providing nearly all long-haul Navy/Marine Corps connectivity, as well as over-the-horizon in-theater service. SSC San Diego programs support upgrades to existing military SATCOM systems, such as the Afloat Telecommunications Service terminal upgrade in super high frequency (SHF). SSC San Diego programs support emerging services such as extremely high-frequency (EHF) and SHF SATCOM, and near-term implementations such as International Maritime Satellite 'B', Television-Direct to Ship, Global Broadcast Service, and Challenge Athena. Our programs also support novel and very successful use of seemingly outdated technology through our development of high-frequency battle force e-mail, now widely used to provide capabilities from tactical operations communications to personal e-mail to families at home.

ACMS Increment Two

Formal tests were completed on Increment Two of the Automated Communications Management System (ACMS) software project. This increment was delivered to the satellite integration facility for system testing. Delivery to the first user, the Military Strategic Tactical and Relay Satellite (MILSTAR) Communication System Satellite Operations Center was scheduled for June 1998.

MILSTAR is the DoD's survivable satellite communications system. The final size of Build One will be 500,000 lines of manually developed code plus approximately one million auto-generated lines of code developed mostly on-site at SSC San Diego.

The software developed will provide the planning tools for the MILSTAR satellite to allocate the communications resources and capabilities for the different services and entities that use it.

ACMS is a tri-service program of the Army, Air Force, and Navy. The program sponsor is the Military Satellite Communications Joint Program Office, Los Angeles Air Force Base.

Global Broadcast Service (GBS) Payload Onboard UHF Follow-on F8 Satellite

A Navy and Hughes team completed testing of the Global Broadcast Service (GBS) payload onboard the Ultra-High-Frequency (UHF) Follow-on F8 satellite. SSC San Diego expertise was instrumental in effecting fast reaction support to resolve several problems that occurred during the installation, including a relocation of the perimeter fence to correct a radio-frequency transmission blockage.

The UHF Follow-on F8 satellite transmits EHF, UHF, and GBS data and voice communications to military activities. The F8 satellite is the first of three UHF follow-on satellites that will have GBS transponders. The three satellites will provide GBS coverage to most of the earth's surface between latitudes of plus and minus 70 degrees. On-orbit testing for F9 and F10 will also be conducted. The F8 satellite will provide coverage over the Pacific Ocean.

The first shipboard terminals are scheduled for installation starting in FY 1999. The combination of the new transponders on the UHF satellites with the terminal equipment will complete the suite of equipment necessary for GBS communications.

Demand Assigned Multiple Access (DAMA) Automatic Control (AC) Mode

June 1998 marked the 1-year anniversary of the successful real-world operation of Demand Assigned Multiple Access (DAMA) Automatic Control (AC) Mode. Based on the successful results of DAMA Semi-Automatic Controller (DAMA SAC) system installation and AC Mode equipment verification testing, AC Mode has now been embraced by all the services. It has become the standard operating mode for current and new UHF SATCOM terminals.

Submarine Communications

For decades, SSC San Diego has played a leadership role in development of submarine communications, providing substantial improvements in low-frequency and very low-frequency capabilities that provide connectivity between submarine forces (both tactical and strategic) and command centers ashore, afloat, and airborne. SSC San Diego submarine communications programs include development of the signal reception and distribution system for the Joint Maritime Command Information System and the Submarine Communications Support System. SSC San Diego has established C⁴I connectivity to many submarines operating with carrier battle groups through deployment of Joint Tactical Information Distribution System (JTIDS) terminals on those submarines. SSC San Diego is working to increase the number of those submarines. With that capability, the submarines can operate as a more integral part of the carrier battle group, to the point of being able to transmit periscope imagery from the submarine to the battle group commander via JTIDS.

The submarine force has needed a cesium beam replacement to provide precise timing and reference frequencies to mission-critical systems. The Submarine C^{4}I Systems Support Branch accomplished this as the newly designated ISEA for the AN/BSQ–9(V), Time Frequency Distribution System (TFDS).

As an abbreviated acquisition program, TFDS has gone from operational requirements approval to deployment in approximately 2 years. During the first year, the program focused on defining the performance specifications of the system, reaching Milestone III approval, and awarding an Indefinite Quantity Indefinite Delivery Order type contract to industry. During the second year, the first article TFDS equipment underwent technical, operational, shock, and environmental testing with outstanding results.

The AN/BSQ–9(V) design is modular, durable, and expandable to allow the system to meet almost any operational requirement. The system can be configured with ovenized crystal, rubidium, or cesium oscillators in single or redundant quantities. Distribution requirements determine what time and frequency signals are selected. A fiber-optic interface can also support a distributed architecture for large deck platforms. TFDS generates distributed precision time, time intervals, and frequency signals automatically synchronized to universal coordinated time. A GPS receiver synchronizes and disciplines the system.

On 13 November 1998, the installation onboard USS *Cheyenne* (SSN 773) completed the initial operational capability (IOC) milestone. The completion of IOC allows the TFDS program to fill the Office of the Chief of Naval Operations requirements for systems in the Fleet. The Submarine C^{4}I Systems Support Branch has now fielded six systems to the submarine fleet in response to type commanders' requests. The Fleet has responded with high praise for the newly developed system. The modular design and the technologies employed make it a perfect candidate for much broader application in the U.S. Navy.

Tropospheric Effects and Assessment

The primary environmental effects addressed by SSC San Diego's Tropospheric Branch are the propagation of electromagnetic (EM) and electrooptical (EO) energy. The Branch technology program provides tactical environmental information to both the operational decision-maker and the systems developer. Proper consideration of the effects of the operational environment and exploitation and mitigation of environmental phenomena is a cost-effective approach to maximize use of existing systems, and to optimize future weapon and sensor system design. The Branch conducts research and development efforts in the following areas: Tropospheric Radio Propagation, EO Propagation, Propagation Assessment Systems and Tactical Decision Aids, and Remote and Direct Sensing Techniques and Measurements.

SSC San Diego's Tropospheric Branch developed new and different ideas for using the GPS. GPS is a satellite-based system intended to provide users location and time anywhere in the world.

The Branch found that by monitoring satellite signals close to the horizon, GPS could also be used effectively as a remote-sensing tide gauge. The same signals

can be used to determine refractive conditions of the lower atmosphere that are important for assessing performance of naval radar and radio frequency communications systems.

Embeddable Information Security (INFOSEC) Product

The Embeddable Information Security (INFOSEC) Product (EIP) is an embeddable 6U Versa Module Eurocard (VME) board that provides encryption and decryption services for numerous applications as part of communications systems, subsystems, and networks.

The EIP is used as an embeddable component in a host system; it slides into a VME chassis. The VME chassis may be a stand-alone RED chassis, a user workstation with built-in VME bus slots, or a dual RED–BLACK chassis with multiple compartments and backplanes. The EIP can be fielded in shore environments or tactical environments onboard ships, aircraft, and submarines.

A Software Capability Evaluation of SSC San Diego's Communications and INFOSEC Systems Support and Integration Division and the EIP project was performed in September 1998. The evaluation resulted in a Trusted Capability Maturity Model (TCMM) Maturity Level 2 and a Trust Class rating of 2. The D873 EIP project now has the distinction of being the only Navy INFOSEC project achieving a TCMM Level 2 maturity rating and a Trust Class 2 rating.

The evaluation represents the completion of a major milestone in the SSC San Diego Software Product Initiative (SPI). The goal for SPI at the Center is to continue improving software engineering practices and to achieve a SW–CMM Level 3 rating for the Center.

Model Range Arch

The model range arch is a tripod used for testing surface ship high-frequency antennas. Instead of making full-size antennas and testing them aboard ships at sea, a model at 1/48th scale is created and placed on a turntable in the center of the arch for a testing scenario. The area directly under the tower simulates the ocean. One of the legs on the tripod structure holds a transmitting antenna trolley that moves up, down, and sideways to simulate the desired signals from another ship at a different point on the globe. Simulating communications scenarios can save research dollars by determining the optimum locations to place an antenna to minimize interference and maximize communication range.

The National Council of Structural Engineers honored members of SSC San Diego's Engineering/Planning Branch for their one-of-a-kind design contributions to the glass-fiber-reinforced, high-density-plastic model range arch. The arch was one of only five California projects honored.

The arch was developed as a partnership between the support code capabilities of SSC San Diego's Facilities Engineering Office and technical code mission requirements of the Electromagnetics and Advanced Technology Division.

The unique composite material of the construction satisfies all technical application requirements and will not reflect or confuse signals. The technology was specifically developed for the project.

Integrated Circuit and Fabrication Facility (ICFF)

SSC San Diego's new Integrated Circuit Fabrication Facility (ICFF) opened on 4 December 1998. The ICFF will serve as the Navy's principal in-house site for development of current and advanced, silicon-based integrated circuit (IC) materials, devices, and manufacturing processes.

In contrast to conventional silicon foundries, the ICFF can accommodate a wide range of silicon-based technologies. The ICFF has developed a unique, high-performance silicon-on-sapphire technology that is particularly suited to radio-frequency "systems-on-a-chip," incorporating digital and analog functions in the multi-gigahertz frequency range. Operation up to at least X-band is anticipated with this technology.

To accommodate future requirements for advanced integrated circuits within DoD, the ICFF has upgraded to 150-mm-diameter silicon wafers combined with the capability to define features down to 0.35 microns. The ICFF has focused on developing readily scaleable silicon-on-insulator and sensor technologies that permit aggressive reduction in feature dimensions while maintaining the high reliability and radiation hardness demanded by users of military electronics. This ability to span the full range from early materials and device research to the development of a manufacturable IC fabrication process is unique within DoD.

SPAWAR Systems Activity, Pacific (D90)

SURTASS Support

SPAWAR Systems Activity, Pacific in Hawaii provides technical and logistical support for the Surveillance Towed Array Sensor System (SURTASS) ships and facilities. SURTASS is a mobile, passive undersea surveillance system; the system acquires data with an acoustic sensor array towed by a dedicated Auxiliary General Ocean Surveillance Ship (T–AGOS). The Integrated Undersea Surveillance System Operations Support Detachment at SPAWAR Systems Activity, Pacific in Hawaii provides intermediate maintenance, dockside technical assistance, configuration management, fleet engineering, supply support, and fleet training.

In 1998, SPAWAR Systems Center Activity, Pacific dedicated the Towed Array Surface Ship (T–AGOS) Victor Pier 5/6. The new pier will facilitate maintenance for T–AGOS ships. Victory Pier 5/6, also known as the SURTASS Pier, was built to support the unique requirements of the active SURTASS Small-Waterplane-Area Twin Hull (SWATH) class of ships homeported in Pearl Harbor. The piers are collocated with the Integrated Undersea Surveillance Systems (IUSS) support group that provides the logistic and unique array maintenance waterfront support, to ensure an even more efficient operation.

Appendix A:
1998 Awards

Appendix A: 1998 Awards

1998 SSC SAN DIEGO AWARDS

Presidential Rank Award

Dr. Robert Kolb

NAVY AWARDS

Navy Distinguished Civilian Service Award

Sandra Wetzel–Smith for program management of the Interactive Multidimensional Analysis Trainer. Ms. Wetzel–Smith developed a system that provides training and mission rehearsal, critical training in multisensor analysis and coordinated operations, and the ability to gain experience against a variety of threats.

Navy Superior Civilian Service Award

Randy Cieslak and Bob Stephenson for service on the Information Technology for the 21st Century (IT-21) project. Mr. Cieslak was architect of the Fleet Systems Integration Team—a concept establishing a small professional cadre of systems engineers ashore at fleet concentration areas around the world. The team provides critical systems integration and support services for afloat forces. Mr. Stephenson was cited for the engineering designs of the IT-21 core communications and network systems components.

Navy Meritorious Civilian Service Award

Arturo Arriola for developing the Missile Test and Readiness equipment from concept, design, and development model phases

James Brauer for developing the theater warfare business area into three independent, fully funded, and growing programs

David Chadwick for service as principal investigator for the Marine Environmental Quality Branch

Leonard Coppenrath for acting as the key member in an integrated product team developing a common system architecture for cryptologic systems used by surface, subsurface, and air platforms

Lorraine Duffy for managing the Command, Control, Communications, and Intelligence Collaborative Virtual Workspace project

Scott Fagergren for assuming oversight and coordination of the Defense Industrial Financial Management System Central Design Activity

Jay Hicks for performing as principal investigator for two Office of Naval Research projects and for an independent research project

Gary Huckell for devising a solution to a well-documented problem with the existing 5-kilohertz Demand Assigned Multiple Access waveform

Laura Knight for proposing a redirection development that may save the Navy $100 million

Linda Kochanski for providing leadership to the Special Security Office

George Kosmos for successful transition of the Warminster Detachment to San Diego

David Law for developing an imaging sensor system for seal delivery vehicles and a life-saving telemedicine system

James Logan for contributing to the success of numerous communications programs

Brian Marsh for leadership in the development, implementation, and fielding of the Joint Maritime Communications Strategy

Gordon Mattis for serving as engineer in charge of a modular, deployable, "flyaway" command and control system engineered for the Commanding General, Marine Forces Pacific

Theresa Myers for acting as Information Exchange System transition manager, Tactical and Battle Cube Systems branch head and the transition leader on the Information Exchange and Automated Digital Networking System Integrated Product Team

Christopher Peebles for leading an SSC San Diego team to act as technical design agent and software support activity for the Tactical Environmental Support System Next Century and design and integration agent for the Navy Integrated Tactical Environmental Subsystem

Joseph Rice for acting as chief scientist, principal investigator, or a support scientist for various projects in the field of underwater acoustics and ocean surveillance

Susan Senese for resolving numerous alteration installation team issues

Jackie Stull for coordinating agendas for special visitors to ensure that important guests receive exceptional care

Byron Summers for contributing to development of the Improved Point Defense Target Acquisition Radar System program

Charles Urbanski for leading development, installation, and support of digital-imagery projects

Steven Whiteside for acting as project manager and technical lead for the Advanced Deployable Systems Project

Navy Awards of Merit for Group Achievement

Waterside Security System team (for building and installing the Electronic Harbor Security System, coordinating and effecting rapid installation of a swimmer detection sonar in the Persian Gulf, and developing and demonstrating a transportable Waterside Security System): Edward Baxter, program manager, Robert Floyd, Marjorie Fong, Ronald Gardner, John Girdwood, Warren Hahn, Wesley Larson, Brian Matsuyama, Milo McManus, Cynthia Milholland, Lloyd Yano, Diana Griffin, Dr. James Warner, Robert Bixler, Thomas Knoebel (all SSC San Diego), and also Douglas Kolste (Naval Submarine Base, Bangor, Washington)

Deputy Executive Director for Corporate Operations for implementing the Standard Labor Data Collection and Distribution Application (SLDCADA) Time and Attendance system: Rich Martin and Mary Jo Follett (team leaders) and Marva Bragg, Lupe Castro, Steven Cooper, Cecile Fix, Vanessa Hubbard, Gonsalo Islas, Edmond Lilly, Pamela Lindke, Patricia Olson, Bobby Stacey, Horace Stanton, David Steber, Diana Tolentino, Teresa Weisbecker, Theo Zook, and Maeola Ogden

Advanced Combat Direction System LHA-1 class upgrade project team for logistics, design, system integration, and coordination efforts resulting in a expeditious solution to a number of fleet problems: Margaret Boyson, Burton Carlson, James Culligan, Harry Gold, Aldan Gomez, Richard Kolb, Doug Lasniewski, Robert Laughlin, Chuck Ledwin, David Lutz, John McCormick, Robert Medearis, James Morrow, Robert Motyl, Thomas Shay, Joe Simon, Robert D. Smith, Charles Suggs, George Sweeney, Michael Taylor, William Thorpe, Ken Washington, Lee Wise, Richard Worthen, and Mark Zabriskie

Image Product Library (IPL) program team at SSC San Diego's Philadelphia Detachment, for fielding and supporting IPL Version 1.0, which provides the imagery community with an integrated architecture for disseminating and archiving imagery products: Joel Cohen, Vivian DiCristafaro, Louis Digirolamo, Margaret Fagan, Robert Flipse, Frank Greco, Robert Mullen, Eileen Nikander, and Robert Overholt

FEDERAL AGENCY AWARDS

National Intelligence Medal of Achievement

Jace LeBlanc, for service to the National Program Activity Research and Development Office in reducing costs and increasing efficiency of national space assets

NASA Class I New Technology Brief Award

Dr. Randy Shimabukuro and Dr. Stephen Russell for "Transmissive Surface Plasmon Light Valve" invention

General Services Administration Valuable Customer Award

Ann Todd

SPAWAR Lightning Bolt Award

C[4]ISR Systems Integration Environment team for successfully bringing system-engineering solutions, validated in the virtual lab environment, to the Fleet prior to deployment: Sally Sebert, SSC San Diego site representative; and Tom Aird, Ray Barrera, Jim Carlson, Steve Chance, Rudy Chavez, Darlene Custodio, Marcus Fieger, John Grimm, Dave Hailand, Chris Hansen, Ken Kaufmann, Karen Lawrence, Bill Marhulik, Jim Macisaac, Michele McGuire, Steve Musson, Mircea Oprea, Anh Quy, Larry Shute, Joe Spencer, Delores Washburn, and Paul Weckesser

Special Act Awards

Henry Gok, from the Department of the Army, for performance on the Joint Tactical Terminal/Common Integrated Broadcast Service Modules Source Selection Evaluation Board

Stephen Kuba for technical contributions to the Voice, Video, and Data (ViViD) contract for telecommunications modernization

Jack Kuerzi for efforts for the U.S. Army Communications and Electronics Command as lead engineer in implementing the Unified Information Security Criteria into the Near-Term Digital Radio contract for the crypto design

James Logan for service as lead electromagnetics engineer for the Advanced Enclosed Mast/Sensor System

David Lukasik for assistance with preparation of contracting documents for the acquisition of the Voice, Video, and Data (ViViD) project

Ron Sato from the Defense Information Systems Agency for his role in the acquisition process of the Defense Information System Network (DISN) Hawaii Information Transfer System

Joint Maritime Command Information System (JMCIS 98) for JMCIS procurement efforts: Michelle Bailey, leader; Larry Core, Elizabeth Holland. and Contractor Kay Sowers; and SPAWAR employees Pat Byrne, Randy South, Gary Baker, Kathy Clark, Ruthann Zombolas, Mike Spencer, and Patty Ashenfelter

ORGANIZATIONAL AWARDS

NATO Research and Technology Organization Scientific Achievement Award

Dr. Juergen Richter for technical achievements in propagation assessment and for involvement with NATO R&D efforts

Seaver Grant

Patrick Moore and Dr. Randy Brill, to conduct dolphin research

U.S. Naval Institute and Armed Forces Communications and Electronics Association (AFCEA)/U.S.Naval Institute Copernicus Awards

Randy Cieslak for major efforts in the initial implementation of the Information Transfer for the 21st Century (IT-21) C4I initiative

Gordon Mattis for service as lead design engineer and architect for the upgraded Mobile Ashore Support Terminal

National Council of Structural Engineers Association Design Award

Gene Olaes and Don Lydy for Shipboard Antenna Model Range antenna arch

Toastmaster of the Year for Toastmasters International District 5

Doug Evans

CENTER AWARDS

Lauritsen–Bennett Awards

For engineering: John Rockway, for major contributions in the fields of numerical electromagnetics, communication system engineering, and simulation of communication and surveillance antennas

For science: Dr. Bob Dinger, for efforts in the fields of extremely low frequency communications, superconducting antennas, submarine magnetic anomaly detection, adaptive antennas, radar glint reduction, radar target imaging, and tactical high-frequency radar

Publications Awards

Publications of the Year

John Bott, Wallace Bryan, Dr. Adi Bulsara, Jeffrey Coleman, Douglas Gage, Lee Hood, Mario Inchiosa, Dr. William Marsh, Brett Martin, Douglas Murphy, Hoa Nguyen, Richard Paulus, Lee Rogers, and Dr. Richard Scheps

Distinguished

Dr. Roy Axford, Wallace Bryan, Donald Butts, Bart Chadwick, Stacey Curtis, Peter Donich, Dr. Clancy Fuzak, Dr. Susan Hearold, Charles Katz, Jimmy Lam, Kathleen Littfin, Dr. Charles McGrath, Chuck Mirabile, Victor Monteleon, Dr. Richard North, Kevin Owens, Andrew Patterson, John Rockway, James Rohr, Linda Russell, Dr. Mark Shensa, Harold Smith, Darlene Wentworth, Frank White, Dr. Carl Zeisse

Excellence

Dr. Adi Bulsara, Dr. Marion Ceruti, Dr. Robert Dinger, Mario Inchiosa, Dr. Brenda–Lee Karasik, Erik Nelson, Mark North, Dr. Glenn Osga, Dr. Stephen Stewart

Merit

Dr. Adi Bulsara, Dr. George Dillard, Sally Parker, Dr. Mark Shensa, Byron Summers

Secretarial Awards

Crystal Oliveras
Aurora Macam

Exemplary Achievement Awards

Edgar Alburo	Juliana Howell	William Pettus
Annie Andersen	Tri Hua	Marcela Pisano
John Andrews	Lesley Hubbard	Linda Ranck
William Ault	Rebecca Inderieden	Marc Rasmussen
Betty Baran	John Johnson	Timothy Rastok
Mark Bauer	David Kellmeyer	David Richter
Wade Bolton	Thomas Kemp	Paul Rigdon
Kathleen Boyles	Tae Kim	Gloria Rufus
Joe Bullock	Victoria Kirtay	Philip Schey
Sandyi Campbell	Carol Kropp	Thomas Schmitt
John Chandler	Karen Lawrence	Charles Schwartz
Russel Clement	Eric Lind	Gregory Shaffer
Gary Clinesmith	Pamela Lindke	Danny Shinder
Robert Cooper	John Maddox	James Smith
Peter Craig	Danny Major	Richard Smurlo
Sherry Crisp	Angel Maldonado	Kelly Sobon
Nhu Nga Thi Do	Brett Martin	David Stevens
Doug Evans	Dennis Mattison	Anil Tailor
George Evenoff	John Meloling	Lydia Tannarome
Janet Fader	Roger Merk	Kathleen Terrado
Mark Freedman	Samuel Milligan	David Tofte
David Fusco	Victor Mobert	Dieu Truong–Vo
Gary Gilbreath	Heidi Mohlenbrok	Thomas Underwood
Yolanda Gomez	Steven Murphy	Rosamelia Valderrama
Tammie Gore	Ross Myers	Sung Vo
Tom Gronholt	Annette Nielsen	Christian Von Mueller
David Guitas	Claude Norton	John Wasilewski
Jack Hayes	Maureen O'Brien	James Weatherford
Richard Hirschi	Patrick Osborne	Carole White
James Hlava	Ward Page	Roy Wurth
Julie Hudson	Darwin Paras	John Yen
Mark Hogue	Joyce Patterson	

Beneficial Suggestion Awards

Bill Schleiger and Steve Geller, for correcting the grounding deficiency in the KGX-40/KGX-40A circuit card equipment

COMMUNITY AWARDS

Aubrey Award from Association of Community Theatres

Dr. Michael Shapiro for sound effects for an association play

MILITARY AWARDS

1998 SSC San Diego Sailor of the Year

Engineman First Class Ronaldo Reyes

Navy Commendation Medal

LCDR Robert Francis

Navy and Marine Corps Achievement Medal

RM2 Lana Tullos for service as systems operator for the Navy EHF Satellite Program

Appendix B:
1998 Patent Awards

1998 PATENT AWARDS

Inventor(s)	Title	Patent No.	Date
Akluifi, Monti. E.	Method of Making Buried Gate Insulator Field Effect Transistor	5,705,412	6 Jan 98
Cartagena, Eric N. Walker, Howard W.	Complementary Vertical Bipolar Junction Transistors Formed in Silicon-on-Sapphire	5,714,793	3 Feb 98
Johnson, Leopold J.	High Power Factor Shield Superconducting Transformer	5,719,545	17 Feb 98
Copeland, Hugh D. Losse, Jon R. Mastny, Gary F.	Thermal Neutron Detector	5,734,689	31 Mar 98
Harris, Frederick J. Caulfield, Robert W. McKnight, William H.	Sigma-Delta Modulator with Tunable Signal Passband	5,736,950	7 Apr 98
Scheps, Richard Myers, Joseph F.	Laser with Multiple Gain Elements	5,737,347	7 Apr 98
Hansen, Peder M. Smith Eldred M.	Inflatable Hi Q Toroidal Inductor	5,739,738	14 Apr 98
Dyckman, Howard L.	Spread Spectrum Modulation Using Time Varying Linear Filtering	5,748,667	5 May 98
Osga, Glenn A.	Method and Apparatus for Enhancing Computer-User Selection of Computer-Displayed Objects Through Dynamic Selection Area and Constant Visual Feedback	5,757,358	26 May 98
Caulfield, Robert W. Harris, Frederick J. McKnight, William H.	Digital Mixing to Baseband Decimation Filter	5,757,867	26 May 98
Harris, Frederick J. Caulfield, Robert W. McKnight, William H	Distributed Quantization Noise Transmission Zeros in Cascaded Sigma-Delta Modulators	5,760,722	2 Jun 98
Scheps, Richard	Laser Diode Power Combiner	5,764,677	9 Jun 98
Lewis, Gregory W. Ryan–Jones, David L.	Evaluation of a Subject's Interet in Education, Training, and Other Materials Using Brain Activity Patterns	5,762,611	9 Jun 98
Bulsara, Adi R. Ditto, William L. Inchiosa, Mario E. Lindner, John F. Meadows, Brian K.	Noise- and Coupling-Tuned Signal Processor with Arrays of Nonlinear Dynamic Elements	5,789,961	4 Aug 98
McDonald, Vincent K. Olson, Jack R. Sotirin, Barbara J. Williams, Robert B.	System for Determining Time Between Events Using a Voltage Ramp Generator	5,801,560	1 Sep 98
Andrews, Daniel E., Jr. Klund, William E. Isaak, Robert D.	Secure Communication System	5,805,635	8 Sep 98

1998 PATENT AWARDS (Continued)

Inventor(s)	Title	Patent No.	Date
Anderson, Kenneth D.	Method for Remotely Determining Sea Surface Roughness and Wind Speed at a Water Surface	5,808,741	15 Sep 98
Everett, Hobart R., Jr. Gilbreath, Gary A. Inderieden, Rebecca S. Tran, Theresa T. Holland, John M.	Optically Based Position Location System for an Autonomous Guided Vehicle	5,812,267	22 Sep 98
Ho, Thinh Q. Hart, Stephen M. Kosinovsky, Gregory A. Henry, Willard I.	Wideband High Isolation Circulator Network	5,815,803	29 Sep 98
Hammond, Russell E. Johnson, Leopold J.	Transformer Which Uses Bi-directional Synchronous Rectification to Transform the Voltage of an Input Signal into an Output Signal Having a Different Voltage and Method for Effectuating Same	5,815,384	29 Sep 98
Scheps, Richard	Wavelength Independent Optical Probe	5,818,601	6 Oct 98
Ream, Donald E., Jr.	Concentric Fluid Acoustic Transponder	5,822,272	13 Oct 98
Russell, Stephen D.	System Which Uses Porous Silicon for Down Converting Electromagnetic Energy to an Energy Level Within the BandPass of an Electromagnetic Energy Detector	5,828,118	27 Oct 98
Copeland, Hugh D. Lapota, David Rosenberger, Dena E. Mastny, Gary F.	Bioluminescent Bioassay System	5,840,572	24 Nov 98
Russell, Stephen D. Sexton, Douglas A. Kelley, Eugene P. Reedy, Ronald E.	Method of Improving the Spectral Response and Dark Current Characteristics of an Image Gathering Detector	5,840,592	24 Nov 98
Miller, Howard A.	Continuous Strength Member	5,844,860	1 Dec 98

Appendix C: 1998 Distinguished Visitors

Appendix C: 1998 Distinguished Visitors

JANUARY

8   Rep. Curt Weldon (R–PA)
        Chair
        Military R&D Subcommittee
        National Security Committee
        U.S. House of Representatives

        Mr. Jean Reed
        Professional Staff Member
        U.S. House of Representatives

        Rear Admiral Norbert Ryan, Jr., USN
        Chief of Legislative Affairs
        Office of the Secretary of the Navy

12   Mr. Gary Reese
        Professional Staff Member
        Appropriations Committee
        U.S. Senate

        Vice Admiral Brent Bennitt, USN
        Commander
        Naval Air Force
        U.S. Pacific Fleet

        Vice Admiral Michael Bowman, USN
        Prospective Commander
        Naval Air Force
        U.S. Pacific Fleet

        Vice Admiral Alexander Krekich, USN
        Commander
        Naval Surface Force
        U.S. Pacific Fleet

12–13   Dr. Paris Genalis
        Deputy Director for Naval Warfare
        Office of the Secretary of Defense

13   Mr. John Sullivan
        Professional Staff Member
        National Security Committee
        U.S. House of Representatives

20   Ms. Diana Josephson
        Principal Deputy Assistant Secretary of the Navy
        (Installations and Environment)
        Office of the Secretary of the Navy

20–26   Mr. Carl Andriani
Director of Science and Technology Office
Office of Naval Research

29   Major General Edward Hanlon, Jr., USMC
Director
Expeditionary Warfare
Office of the Chief of Naval Operations

FEBRUARY

3–4   Mr. Irv Blickstein
Assistant Deputy Chief of Naval Operations
Research, Warfare, Requirements & Assessments
Office of the Chief of Naval Operations

Dr. Timothy Coffey
Director of Research
Naval Research Laboratory

5   Dr. Roger Whiteway
Director
Warfare Programs & Readiness (N8)
Commander-in-Chief, U.S. Atlantic Fleet

20   Major General Joseph T. Anderson, USMC
Chief Information Officer/
Assistant Chief of Staff for C4I
Headquarters, U.S. Marine Corps

Rear Admiral Johannes W.P. Spaans
Director
Directorate of Material Command
Dutch Navy

MARCH

9   Major General Greg Gile, USA
Director for Operations (J3)
U.S. Atlantic Command

Daniel Bowler, USN
Commander
Cruiser-Destroyer Group Five

11–13   Captain John O'Connell, USN
Acting Deputy Assistant Secretary of the Navy for C4I/EW/Space
Office of the Secretary of the Navy

12   Rear Admiral (Sel.) Stanley R. Szemborski, USN
Director
Operations Division
Office of Budget Reports
Office of the Comptroller of the Navy

16   General Birgitta Bohlin
Director General
Swedish Defense Material Administration

18	Rear Admiral Rodney P. Rempt, USN Program Executive Officer for Theatre Air Defense Office of the Assistant Secretary of the Navy (Research, Development and Acquisition)
18–19	Lieutenant General Ronald T. Kadish, USAF Commander U.S. Air Force Electronic Systems Center
23–26	Vice Admiral Herbert A. Browne, Jr., USN Commander Third Fleet Rear Admiral John F. Shipway, USN Commander Naval Undersea Warfare Center Rear Admiral Paul F. Sullivan, USN Commander Submarine Group Nine Rear Admiral John B. Padgett, USN Deputy Director Submarine Warfare Division Office of the Chief of Naval Operations Rear Admiral Malcolm Fages, USN Commander Submarine Group Two Rear Admiral Daniel R. Bowler, USN Commander Cruiser-Destroyer Group Five Rear Admiral Lowell E. Jacoby, USN Director of Naval Intelligence
25	Lieutenant General Carmine Cianci General Manager Telecomdife Italy

APRIL

6	Rear Admiral John M. Luecke, USN Deputy and Chief of Staff U.S. Atlantic Fleet
6–7	Ms. Monica Shephard Director Command, Control, Communications & Computer Systems U.S. Atlantic Fleet
9	Rear Admiral Andrew A. Granuzzo, USN Director Environmental Protection Safety and Occupational Health Division (N45) Office of the Chief of Naval Operations

19–24   Ms. Susan Bales
Director
Naval Science Assistance Program

20–24   Major General Safwat El Nahass
Staff
Regimental Headquarters
E-2C Airborne Tactical Data System
Egyptian Air Force

27   Rear Admiral Charles B. Young, USN
Head
Submarine Technology Office
Naval Sea Systems Command

28   Rear Admiral James Taylor, USN
Deputy Chief of Staff
Fleet Maintenance
Commander-in-Chief, U.S. Pacific Fleet

MAY

6–7   Dr. Ann Miller
Deputy Assistant Secretary of the Navy
for C4I/EW/SPACE and
Chief Information Officer
Department of the Navy

12–13   Admiral James R. Hogg, USN (Ret.)
Director
Strategic Studies Group
Office of the Chief of Naval Operations

21   Rear Admiral M. Savas Onur
Chief
Research and Development Department
Turkish Naval Forces, Ankara

22   Dr. Frank Fernandez
Director
Defense Advanced Research Projects Agency

28–29   General James McCarthy, USAF (Ret.)
USAF Scientific Advisory Board

29   Representative C.W. "Bill" Young (R.–Fla.)
U.S. House of Representatives

JUNE

22   Dr. Frank Fernandez
Director
Defense Advanced Research Projects Agency

23–25   Rear Admiral David L. Brewer, III, USN
Commander
Amphibious Group Three

26   Rear Admiral Bernard Smith, USN
        Commander
        Naval Strike and Air Warfare Center

JULY

14   Dr. David Tennenhouse
        Director
        Information Technology Office
        Defense Advanced Research Projects Agency

20   Mr. Terrence Ryan
        Director
        ISR Systems
        Office of the Secretary of Defense (C3I)

AUGUST

3   Brigadier General Larry J. Dodgen, USA
        Deputy Director
        Joint Theatre Air and Missile Defense Organization

5   Rear Admiral Kenneth Slaght, USN
        Chief Engineer
        Space and Naval Warfare Systems Command

10   Senator James M. Inhofe (R.–OK)
        U.S. Senate

19   Mr. Jean Reed
        Professional Staff Member
        Committee on National Security
        U.S. House of Representatives

31   Rear Admiral John A. Gauss, USN
        Commander
        Space and Naval Warfare Systems Command

SEPTEMBER

15   Rear Admiral Robert M. Nutwell, USN
        Deputy Director
        Information Warfare, Command & Control (N6B)
        Office of the Chief of Naval Operations

OCTOBER

1   Brigadier James "Dave" Bryan, USA
        Director
        Command, Control, Communications & Computer Systems
        Commander-in-Chief, U.S. Pacific Command

13   Vice Admiral Arthur Cebrowski, USN
        President
        Naval War College

19 Brigadier General Shmuel Yachin
    Head
    Military R&D Unit
    Israeli Ministry of Defense

NOVEMBER

5 Admiral James R. Hogg, USN (Ret.)
    Director
    Strategic Studies Group
    Office of the Chief of Naval Operations

    Rear Admiral William Cross, USN
    Program Executive Officer
    Carrier Programs CVN/CVX
    Naval Sea Systems Command

16 Rear Admiral Paul Bjorn Sorensen
    Deputy Chief of Staff for Materiel
    Infrastructure & Logistics
    Chief of Defence Headquarters, Denmark

    Admiral Sir M.C. Boyce, KCB, OBE, ADC, RN
    First Sea Lord
    Royal Navy

    Rear Admiral R.P. Stevens, RN
    Flag Officer Submarines

18 Rear Admiral Lowell E. "Jake" Jacoby, USN
    Director
    Naval Intelligence

    Rear Admiral Harry W. Whiton, USN
    Commander
    Naval Security Group Command

19 Ms. Pamela Farrell
    Professional Staff Member
    Armed Services Committee
    U.S. Senate

30 Rear Admiral Timothy W. LaFleur, USN
    Commander
    Cruiser-Destroyer Group One

DECEMBER

1 Brigadier General Arthur Sikes, USAF
    Assistant Deputy Director
    Customer Support Team
    National Imagery & Mapping Agency

2 Vice Admiral William J. Fallon, USN
    Commander
    Second Fleet/
    Commander
    Striking Fleet Atlantic

10   Rear Admiral Don Guter, USN
        Deputy Judge Advocate General
        Office of the Commander
        Naval Legal Service Command

29–30   Dr. Marv Langston
        Deputy Assistant Secretary of Defense for Chief Information Officer
        Policy & Implementation/
        Deputy Chief Information Officer
        Office of the Secretary of Defense

Appendix D:
1998 Meetings

Appendix D: 1998 Meetings

FEBRUARY

3–4   Naval Warfare Systems Forum

10–12   Joint Strike Fighter System of Systems Interchange Meeting

MARCH

3–5   West Coast C^{4}ISR IST Conference

10–13   Office of Naval Research Century Scientist Colloquium

16–20   Director of Defense Research and Engineering Technical Area Review and Assessment

24–26   National Defense Industrial Association (NDIA) Undersea Warfare Division Conference

APRIL

1–3   Commander Naval Air Force U.S. Pacific Fleet Combat Systems Officers' Conference

6–9   Generic Area Limitation Environment (GALE) Users Conference

7–9   Marine Corps Warfighting Lab Urban Warrior Working Group Meeting

27–30   Exploitation Technology Symposium (ETS)

MAY

26–29   Office of Naval Research 313 Communications Technology Review Planning and Assessment Meeting

27–28   DoD Joint Robotics Group Meeting

28–29   USAF Scientific Advisory Board Information Management to Support the Warrior

JUNE

10   Naval Sea Systems Command/Space and Naval Warfare Systems Command C^{4}ISR/IT–21 Coordination Meeting

23–25   Amphibious Ship Combat System Working Group Meeting

JULY

13–17   The Technical Cooperation Program (TTCP) Maritime Systems Group Sonar Tehcnology Panel–9

13–24   Naval Research Advisory Committee (NRAC) Summer Study

AUGUST

3–5   Naval Defense Information Infrastructure—Common Operating Environment (DII–COE) Developers Conference

3–13   Naval Intelligence Security Awareness Conference

4   Defense Advanced Research Projects Agency Controlled Biological Systems Program Kick-Off Meeting

11–13   IBM Conference for JAVA

SEPTEMBER

14   Broadcast Operations Integration Group Meeting

15–17   Technology Symposium 38

15–18   Second Integrated Broadcast Service Users' Conference

OCTOBER

6–8   Naval Research Advisory Committee (NRAC) GPS Vulnerability Panel

8   Fourth Annual Submarine Communications and C^4I Systems Technology Conference

14–15   Minimum Essential Emergency Communications Network Integrated Weapon System Management Meeting

20–21   Office of Navy General Counsel Field Counsel Conference

26–29   Global Command and Control System–Maritime/Defense Information Infrastructure Common Operating Environment (GCCS–M/DII COE) 4.0 Developers Conference

26–30   Joint International Configuration Review Board Meeting

NOVEMBER

2–4   United Kingdom Ocean Survey Program Survey System Working Group Meeting

17–18   Standard Tactical Receive Equipment Display Technical Exchange Meeting

18   Global Mobile (GloMo) Information Systems Program Meeting

19   Joint Wireless Networking Meeting

DECEMBER

7–11   US/UK Battleforce EMI Evaluation System (BEES) meeting

8–10   Unmanned Combat Air Vehicles (UCAV) Workshop

8–10   Office of Naval Research Undersea Warfare Broadband Processing Working Group meeting

14–17   Joint U.S. Israeli International Review

Appendix E: Acronyms

Appendix E: Acronyms

AAW	Anti-Air Warfare
AC	Automatic Control
ACDS	Advanced Combat Direction Systems
ACMS	Automated Communications Management System
ACTD	Advanced Concept Technology Demonstration
ASUW	Antisurface Warfare
ASW	Antisubmarine Warfare
ATV	Advanced Tethered Vehicle
BEES	Battleforce EMI Evaluation System
BRAC '95	Base Closure and Realignment Commission Action in 1995
C^3D	Command, Control, Communications, and Display
C^4I	Command, Control, Communications, Computers, and Intelligence
C^4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
C^4ISR SIE	C^4ISR Systems Integration Environment
CEA	Central Engineering Activity
CINCPACFLT	Commander-in-Chief, Pacific Fleet
CNO	Chief of Naval Operations
COMOPTEVFOR	Commander, Operational Test and Evaluation Force
COMSEVENTHFLT	Commander, Seventh Fleet
CONUS	Continental U.S.
COTS	Commercial Off-the-Shelf
CRADA	Cooperative Research and Development Agreement
DAMA	Demand Assigned Multiple Access
DAMA SAC	DAMA Semi-Automatic Controller
DARPA	Defense Advanced Research Projects Agency
DAWN	Defense Information System Agency/Defense Information System Network Asynchronous Transfer Mode Wide Area Network
DCRS	Digital Camera Receiving Station
DII–COE	Defense Information Infrastructure–Common Operating Environment
DISN	Defense Information System Network
DoD	Department of Defense
ECOC	Enhanced Combat Operations Center
EHF	Extremely High Frequency
EIP	Embeddable INFOSEC Product
ELB	Extending the Littoral Battlespace
EM	Electromagnetic
EO	Electrooptical
EODMUTHREE	Explosive Ordnance Disposal Mobile Unit Three
ESM	Electronic Support Measures
ETS	Exploitation Technology Symposium

FEMA	Federal Emergency Management Agency
FPXRF	Field-Portable X-ray Fluorescent
FY	Fiscal Year
GALE	Generic Area Limitation Environment
GBS	Global Broadcast Service
GCCS	Global Command Control System
GCCS–M	Global Command and Control System–Maritime
GCCS–M/DII COE	Global Command and Control System–Maritime/Defense Information Infrastructure Common Operating Environment
GloMo	Global Mobile
GPS	Global Positioning System
IC	Integrated Circuit
ICFF	Integrated Circuit Fabrication Facility
ILIR	In-House Laboratory Independent Research
IMAS	Intelligent Management Application System
INFOSEC	Information Security
IOC	Initial Operational Capability
IOCOE	Information Operations Center of Excellence
IOCOF	Information Operations Center of the Future
IPL	Image Product Library
ISEA	In-Service Engineering Agent
ISO	Imagery Support Office
IT-21	Information Technology for the 21st Century
ITO	Information Technology Office
IUSS	Integrated Undersea Surveillance Systems
IVCS	Integrated Voice Communications System
JMCIS	Joint Maritime Command Information System
JTIDS	Joint Tactical Information Distribution System
MARCOT	Maritime Combined Operations Training
MDARS	Mobile Detection Assessment Response System
METOC	Meteorological and Oceanographic
MILSTAR	Military Strategic Tactical and Relay Satellite
MMS	Marine Mammal System
MOMCOM	Man on the Move Communications
MOU	Memorandum of Understanding
MRHA	Multiple Resource Host Architecture
MSD1	Major System Demonstration
MTBF	Mean Time Between Failures
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NAVSSI	Navigation Sensor System Interface
NC T	Next Century Transition
NDIA	National Defense Industrial Association
NIMA	National Imagery and Mapping Agency
NOSC	Naval Ocean Systems Center

NRAC	Naval Research Advisory Committee
NRTF	Naval Radio Transmitter Facility
NTDS	Naval Tactical Data System
O&MN	Operations and Maintenance, Navy
ONR	Office of Naval Research
OPEVAL	Operational Evaluation
OPN	Other Procurement, Navy
PEO	Program Executive Office
PLGR	Precise Lightweight GPS Receiver
PLL	Phase-Locked Loop
PMO	Program Management Office
R&D	Research and Development
RADIAC	Radioactivity Detection, Indication, and Computation
RDT&E	Research, Development, Test and Evaluation
RHIB	Rigid-Hulled Inflatable Boat
RIMPAC	Rim of the Pacific
RPA	Regional Planning Agent
SATCOM	Satellite Communication
SBIR	Small Business Innovation Research
SCE	Software Capability Evaluation
SE&1	
SEPO	Software Engineering Process Office
SERF	Scientific Environmental Research Foundation
SET	Scheduling and Engineering Tool
SHF	Super High Frequency
SIE	Systems Integration Environment
SLDCADA	Standard Labor Data Collection and Distribution Application
SNR	Signal-to-Noise Ratio
SOSUS	Sound Surveillance System
SPAWAR	Space and Naval Warfare Systems Command
SPI	Software Product Initiative
SR	Stochastic Resonance
SSC San Diego	Space and Naval Warfare Systems Center, San Diego
SURTASS	Surveillance Towed Array Sensor System
SWATH	Small-Waterplane-Area Twin Hull
T–AGOS	Towed Array Surface Ship
TARPS(DI)	Tactical Aircraft Reconnaissance Pod System–Digital Imagery
TCMM	Trusted Capability Maturity Model
TESS	Tactical Environmental Support System
TFDS	Time Frequency Distribution System
TRANSDEC	Transducer Evaluation Center
TSWG	Technical Support Working Group
TTCP	The Technical Cooperation Program
UCAV	Unmanned Combat Air Vehicles
UHF	Ultra High Frequency

USACOM	U.S. Atlantic Command
USAF	U.S. Air Force
USMC	U.S. Marine Corps
USPACOM	U.S. Pacific Command
ViViD	Voice, Video, and Data
VLF/LF	Very Low Frequency/Low Frequency
VME	Versa Module Eurocard
WSS	Waterside Security System

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE January 1999	3. REPORT TYPE AND DATES COVERED Jan 1998 – Dec 1998

4. TITLE AND SUBTITLE

SSC SAN DIEGO COMMAND HISTORY
Calendar Year 1998

5. FUNDING NUMBERS

In-house

6. AUTHOR(S)

Technical Information Division

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Space and Naval Warfare Systems Center
San Diego, CA 92152–5001

8. PERFORMING ORGANIZATION REPORT NUMBER

TD 3050

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Space and Naval Warfare Systems Center
San Diego, CA 92152–5001

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

..

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The activities and accomplishments of Space and Naval Warfare Systems Center, San Diego (SSC San Diego) during calendar year 1998 are described, and the Center's mission and responsibilities are delineated.

14. SUBJECT TERMS

command and control
communications
marine mammals
navigation

intelligence, surveillance, and reconnaissance
fleet engineering
ocean engineering

15. NUMBER OF PAGES

86

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	SAME AS REPORT

21a. NAME OF RESPONSIBLE INDIVIDUAL	21b. TELEPHONE (include Area Code)	21c. OFFICE SYMBOL
E. R. Ratliff	(619) 553–4806 e-mail: ratliff@spawar.navy.mil	Code D0271

INITIAL DISTRIBUTION